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First record of the Lessepsian species *Hemiramphus far* (Hemiramphidae) in Italian waters

by

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Résumé. – Premiers signalements de l'espèce lessepsienne *Hemiramphus far* (Hemiramphidae) dans les eaux italiennes.

Plusieurs spécimens de l'espèce lessepsienne *Hemiramphus far* (Forsskål, 1775) ont été capturés par des pêcheurs autour de l'île de Lampedusa (déroit de Sicile) en janvier et août 2013. Leurs caractéristiques morphométriques et méristiques, ainsi que des observations sur leur régime alimentaire, sont présentées. Ces résultats constituent le premier signalement documenté de cette espèce dans les eaux italiennes, ainsi que le chaînon manquant dans son modèle de migration entre les parties orientale et occidentale de la mer Méditerranée.

Key words. – Hemiramphidae - *Hemiramphus far* - Mediterranean Sea - Straits of Sicily - Lessepsian migration - Epipelagic.

The blackbarred halfbeak *Hemiramphus far* (Forsskål, 1775) is an Indo-Pacific species, distributed from the Red Sea and the Indian Ocean to the Samoan Islands (south Pacific) (Froese and Pauly, 2013). Its first record in the Mediterranean Sea dates back 1927, when it was caught in Palestinian waters and classified as *H. marginatus* (Steinitz, 1927). Within the Mediterranean, it spread following two probable branches. First, it moved northward to Lebanon

and Syria, and then westward to southern Turkey, Cyprus, Aegean Sea, where it has settled with established populations; one outlying record is reported in the Adriatic Sea, off the Albanian coast (Kara *et al.*, 2012 and literature therein). The second branch is traceable from the Gulf of Suez westward to the eastern Libyan coasts, from where it probably crossed the Straits of Sicily – i.e. the area between Sicily and Tunisia, which separates western from eastern Mediterranean and is delimited north-west by the imaginary line between Cape Bon and Cape Lilibeo (Fig. 1) – reaching the western Mediterranean Basin in the Gulf of Tunis (Charfi-Cheikhrouha, 2004; Ben Souissi *et al.*, 2005; Rafrafi-Nouira *et al.*, 2012) and in the Algerian coasts (Kara *et al.*, 2012 and literature therein). However, no record of this species has been documented along the western Libyan coasts nor in the Straits of Sicily. The blackbarred halfbeak is an epipelagic coastal species with schooling behaviour; it reaches the maximum total length of 45 cm and matures at about 18 cm of standard length; it spawns in spring-summer, producing eggs attached to floating or anchored vegetation, from which planktonic larvae hatch (Collette and Parin, 1986; Collette and Su, 1986). The present paper documents the first record of *H. far* in the Straits of Sicily as well as in Italian waters.

MATERIALS AND METHODS

On 23 January 2013, about 70 specimens of blackbarred halfbeak *Hemiramphus far* (Forsskål, 1775) of similar size were caught in the coastal waters of Lampedusa Island, Straits of Sicily (35°30'20"N; 12°37'50"E) (Fig. 1). They were fished at daylight, at a depth of 20 m, by a small surrounding net without purse line locally called "agugliara", employed to target needlefish (Belontiidae). Fishermen preserved only six frozen specimens, the others were discarded. Seven months after this capture, on 7 August 2013, another specimen of *H. far*, larger than the previous ones, was fished in the same area by "agugliara", preserved frozen and then delivered to us for identification. All specimens were caught together with several needlefish. The lower jaw and the inferior lobe of caudal fin of some preserved specimens were broken.

The seven specimens were measured considering total length (TL), standard length (SL) and sizes related to head length (HL), from the tip of the upper jaw. Measurements were taken by ichthyometer to the lowest millimetre, except HL, and referred measures were taken by calliper to the lowest 0.1 mm. Meristic data were also recorded. Morphometric and meristic data were compared with those reported in the literature (Parin *et al.*, 1980; Collette and

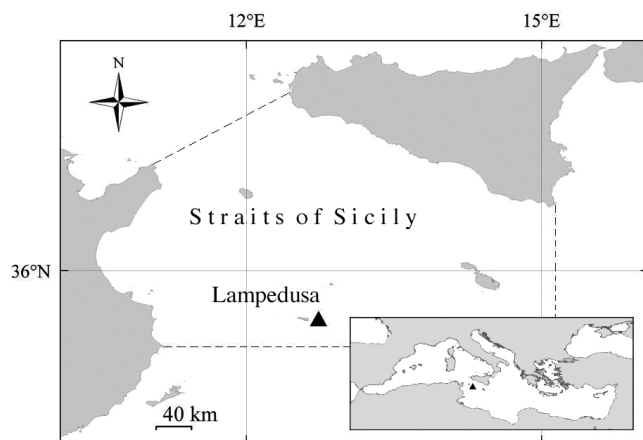


Figure 1. - Capture locality (▲) of *Hemiramphus far* at Lampedusa Island. Dashed lines delimitate the Straits of Sicily.

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Figure 2. - Specimen of *Hemiramphus far* (HEM FAR 7) from Lampedusa Island.

Parin, 1986; Collette and Su, 1986; Akça and Bilecenoglu, 2010; Kara *et al.*, 2012). The gut contents of the seven specimens were analyzed. Their sex and maturity were determined by macroscopic observation of the gonads.

The six specimens collected in January were coded as HEM FAR 1 to HEM FAR 6; the one collected in August was coded as HEM FAR 7 (Fig. 2). Muscle samples of all specimens were preserved in alcohol 80% and stored in the ISPRA alien species tissue bank (Andaloro *et al.*, 2012). Two of the seven specimens collected (HEM FAR 1 and HEM FAR 7) are deposited at the Museum Palazzo D'Aumale of Terrasini (Sicily) with the code numbers 9622 and 9623.

RESULTS

The fresh specimens exhibited the following characters: body elongated, compressed; lower jaw prolonged (broken in five specimens); upper jaw short, triangular, without scales in its upper part; eyes moderately large; body bluish dorsally, silvery ventrally, with four faint dark blotches on dorsal sides, more evident in the larger specimen than in the smaller ones; caudal fin deeply forked with upper lobe yellow, shorter than lower lobe which is bluish.

Morphometric and meristic characters of the examined specimens are reported in table I. In particular: body width was contained 1.5 to 1.7 times in its depth (1.3 to 1.8 from literature); lower jaw was contained 3.3 times in SL (3.0 to 3.9 from literature) and 0.7-0.8 in HL (0.7-0.95 from literature); upper jaw was contained 6.7-8.5 times in HL; head was contained 4.2-4.6 times in SL (3.8-4.6 from literature); pectoral fin was short, 16.7%-19.8% of SL (less than 20% in SL from literature).

The guts of two specimens were empty, whereas the others contained organisms in high degree of digestion, consisting of the following taxa: copepod calanoids, euphausiaceans, insects, nematods, shells of the pelagic mollusc *Creseis* sp., filaments of multicellular seaweeds, crustose coralline algae and several other vegetal fragments.

The sex of the specimens of *H. far* collected in January was undetermined, while the one caught in August was a female with developing pink symmetric ovaries.

DISCUSSION

In the Mediterranean, the family Hemiramphidae is represented by two genera: i) *Hemiramphus* Cuvier, 1816 occurring with the Lessepsian species *Hemiramphus far*; and ii) *Hyporhamphus* Gill, 1859, which differs from the former by having scales and well-developed preorbital ridge on snout, and occurs with two species, the Atlanto-Mediterranean *H. picarti* (Valenciennes, 1846) and the Lessepsian *H. affinis* (Gunther, 1866).

The individuals examined in the present study presented the taxonomical features of the species *H. far*, described by Forsskål (1775) and reported in the identification key of Collette and Parin (1986), such as the long lower jaw, the scaleless snout, the deeply forked caudal fin with the lower greyish lobe much longer than the yellow upper one, the dark blotches on body sides. Morphometric and meristic characters correspond as well as those reported in the literature for *H. far* specimens examined from Mediterranean and extra-Mediterranean areas (Parin *et al.*, 1980; Collette and Su, 1986). However, our specimens showed a percentage of upper jaw in HL lower than that recorded for three other specimens found in the Mediterranean (Akça and Bilecenoglu, 2010; Kara *et al.*, 2012), hence enlarging the range of this ratio for this species. The observation of gut contents confirmed the epipelagic feeding behaviour of this species, mainly based on filamentous algae and zooplanktonic organisms, according to literature (Talwar, 1962; Collette and Parin, 1986). In addition to pelagic prey organisms, guts of *H. far* contained

Table I. - Morphometric (mm) and meristic data of *Hemiramphus far* from Lampedusa Island and data ranges drawn from literature. In parenthesis, percentages of standard length (SL), head length (HL) and body depth (BD).

	23 Jan. 2013 (6 specimens)	07 Aug. 2013 (1 specimen)	Data from literature
Measurements and proportions			
Total weight (g)	16-29	84	
Total length	175-183*	252	
Fork length	139-158	205	
Standard length	131-147	197	
Head length	29.8-33.9 (22.6-23.6 SL)	43 (21.8 SL)	21.1-26.3 SL
Pectoral fin length	23-27 (16.7-18.5 SL)	39.1 (19.8 SL)	14.7-19.2 SL
Preal length	104-118 (77.5-80.3 SL)	158 (80.2 SL)	81.2-83.3 SL
Predorsal length	100-112 (75.7-79.3 SL)	156 (79.2 SL)	77.4-78.9 SL
Lower jaw length	42 (30.2 SL)	60 (30.5 SL)	25.6-33.3 SL
Upper jaw length	3.6-4.5 (11.8-14.1 HL)	6.4 (14.9 HL)	15.2-20.0 HL
Eye diameter	7.8-8.9 (25.2-26.8 HL)	10.8 (25.1 HL)	23.2-26.6 HL
Interorbital distance	7.4-8.5 (23.3-26.6 HL)	12 (27.9 HL)	25.0-28.8 HL
Maximum body depth	19-23 (14.5-15.8 SL)	31 (15.7 SL)	13.7 SL
Body width	12-15 (59.5-66.7 BD)	20.0 (64.5 BD)	55.6-76.9 BD
Meristic data			
Dorsal fin rays	12-13	13	11-15
Anal fin rays	11-12	10	9-13
Pectoral fin rays	12	12	11-13
Ventral fin rays	6	6	6
First arch gill rakers	29-32	34	25-36

* Undamaged specimens (n = 3).

some other organisms, which are not ascribable to the epipelagic domain, such as crustose coralline algae and insects. The occurrence of the former organisms may be explained by feeding activity of blackbarred halfbeak around floating objects, where encrusting benthic organisms settle. Insects might be also ingested in proximity of floating objects or sucked from seawater surface.

The two subsequent catches of *H. far* in Lampedusa Island, represented by about 70 immature specimens (smaller than the maturity size of 180 mm SL) caught in January 2013, together with an adult female in August 2013, may be the first evidence of the establishment of this species in the study area. On the contrary, the previous records of *H. far* in the nearby areas were represented by only one (Tunisian records: Charfi-Cheikhrouha F., 2004; Ben Souissi et al., 2005; Rafrafi-Nouria et al., 2012) or two specimens (Algerian record: Kara et al., 2012).

The arrival of non-indigenous fishes into the Straits of Sicily is not a new event. During the last decades, several Atlantic and Lessepsian fish have been recorded in this area (ISPRA database, www.medalien.isprambiente.it), although the pathways of both groups are not always clearly traceable. In the case of Lessepsian fish that reached the Straits of Sicily, the most reliable hypothesis is that they migrated from the Gulf of Suez through the Egyptian and Libyan coasts, as noticeable from the temporal distribution of records in the eastern Mediterranean Basin (Andaloro et al., 2012). Most of these species have not crossed the Straits of Sicily yet; only few of them – i.e. the nectobenthic fishes *Fistularia commersonii*, *Stephanolepis diaspros*, *Siganus luridus* and *Siganus rivulatus*, and the epipelagic *H. far* – have extended their distribution entering the western Mediterranean Basin (ISPRA database, www.medalien.isprambiente.it; Rafrafi-Nouria et al., 2012). However, unlike the former three species, which have been documented in the Straits of Sicily, the blackbarred halfbeak and the marbled spinefoot *S. rivulatus* had never been registered in this area so far. The twofold finding of *H. far* in Lampedusa Island may represent the missing link in the route from the Libyan coast to the Tunisian and Algerian ones.

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